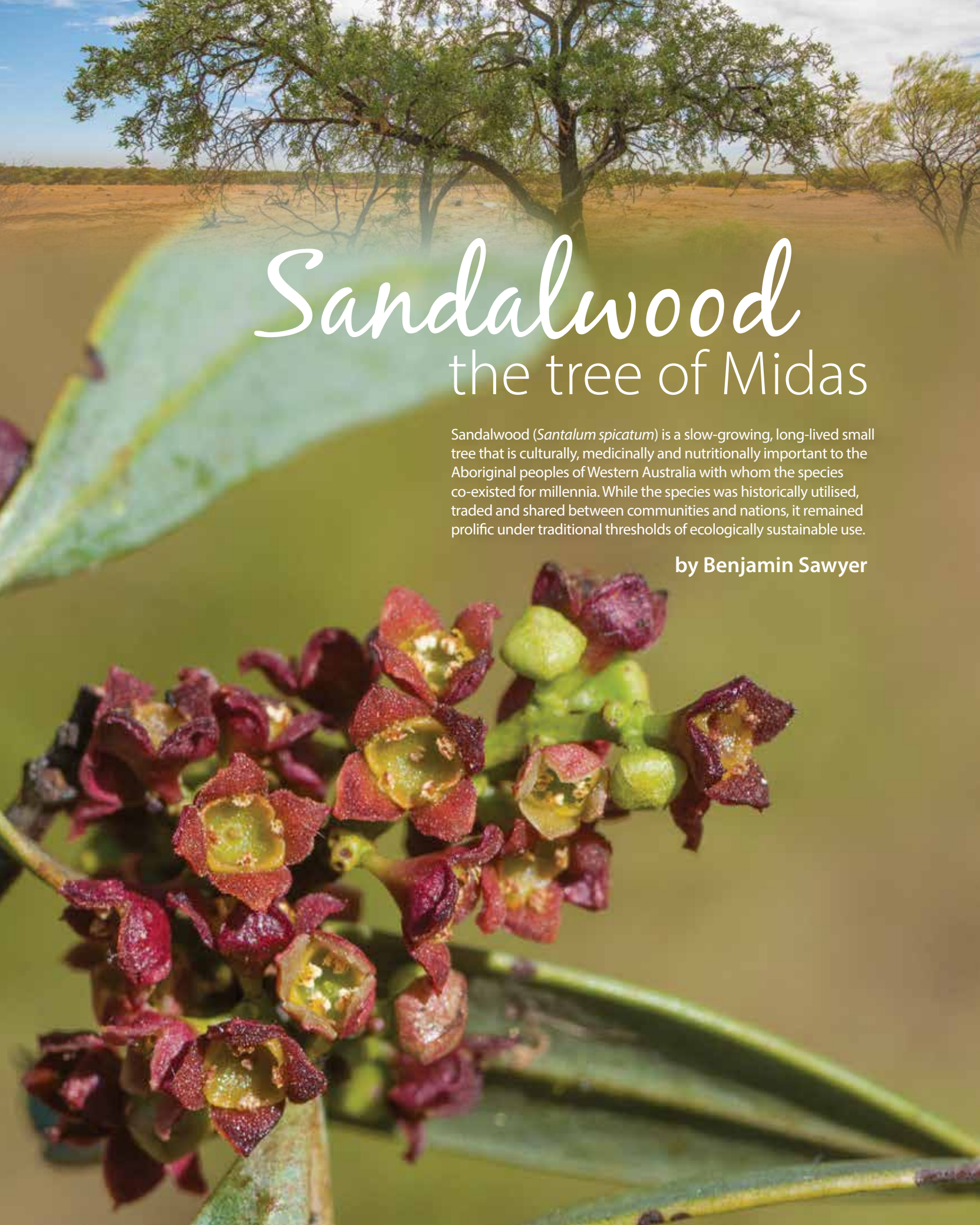


Sandalwood
the tree of Midas

Sandalwood (*Santalum spicatum*) is a slow-growing, long-lived small tree that is culturally, medicinally and nutritionally important to the Aboriginal peoples of Western Australia with whom the species co-existed for millennia. While the species was historically utilised, traded and shared between communities and nations, it remained prolific under traditional thresholds of ecologically sustainable use.

by Benjamin Sawyer

Sandalwood (*Santalum spicatum*) is many things to many people and known by many names including birdilyba, kirti, munyunpa, parnjal, pikarra, tarrtjanpa, tatjan, tujan(pa), thumbuny, uilarac, walarda, walku, warlka, wirawayin, uilarac, waang, willarak, wolgol, wollgat poilyenum, native sandalwood or Western Australian sandalwood.

One of 25 known species of the *Santalum* genus, sandalwood is one of four species that is indigenous to Western Australia. In arid and semi-arid regions, sandalwood typically grows up to four metres in height with a stem diameter of 200 millimetres (measured at 150 millimetres above the ground). An occasional sandalwood specimen growing in the Wheatbelt region may be observed to be more than ten metres in height.

Sandalwood reproduces through production of fruits consisting of a leathery tan-brown outer skin (epicarp) and a smooth round inner nut (endocarp). The endocarp may be 10-25 millimetres in diameter and weigh two-to-three grams. Fruits are dispersed by the seed caching (scatter hoarding) behaviours of ground-dwelling marsupials including woylies (*Bettongia penicillata*) and boodies (*Bettongia lesueur*). Water flow across and through the landscape is also an important seed dispersal and recruitment vector.

A hemi-parasite is a plant that gains part of its resources through connections with another plant while also photosynthesising. Sandalwood is a root hemi-parasite that requires nitrogen-fixing host plants (particularly of the genus Acacia) from soon after germination through to maturity. Sandalwood roots connect to host roots through structures called haustoria. Each haustorium can be up to 20 millimetres in length and an individual sandalwood tree can have hundreds of connections. The haustoria function is to supply the sandalwood tree with water and nutrients from its host.

Within Western Australia, sandalwood is distributed across 173 million hectares of the Wheatbelt, Goldfields, Murchison, Gascoyne and southern Pilbara regions. These lands are the Country of 80 or more Aboriginal groups that, while increasingly considered for Native Title remain largely managed for pastoralism, cropping, conservation, and mineral exploration and extraction.

Previous page
Main Sandalwood flower.
Photo – Jiri Lochman
Inset Sandalwood.
Photo – Marie Lochman

Top left 13-year-old 'planted wild' sandalwood tree producing fruit.

Top right Gnarled stems of an old wild sandalwood tree.

Right A DBCA staff member collecting sandalwood population health data.
Photos – Benjamin Sawyer/DBCA

SPECIES IN DEMAND

The international economic value of sandalwood was recognised by early non-Indigenous settlers who began harvesting and exporting the species in the 1840s. By the 1890s, the economic value of sandalwood to the Western Australian colony (and later State) prompted extensive and ongoing research and inventory that has informed regeneration processes, conservation prescriptions, take limits and resource yield forecasts.

Sandalwood remains economically valuable and is commercially harvested under licence for the aromatic oils contained in its golden heartwood. As the heartwood extends throughout the tree, the whole tree including its roots is removed (taken) and processed.

The combination of environmental and land use changes of the last 200 years has impacted sandalwood occurrence at varying levels across WA's biogeographic regions. The most apparent declines in sandalwood populations are throughout the Avon, Wheatbelt and Mallee regions

Top left Sandalwood tree.
Photo – Marie Lochman

Top Woylie (*Bettongia penicillata*).

Above left Sandalwood fruit.

Above Feral camel.
Photos – Jiri Lochman

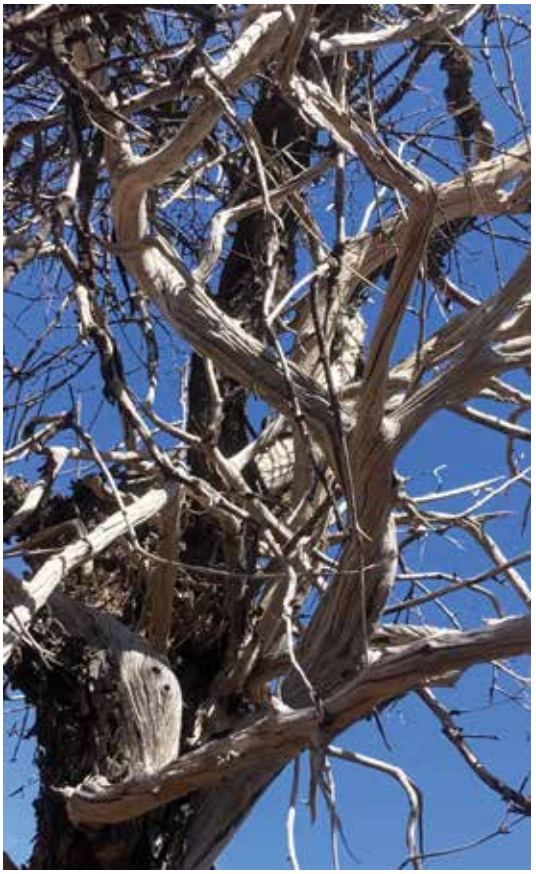
where extensive agricultural clearing has reduced wild sandalwood occurrence to fragmented populations within conservation reserves and remnant native vegetation on private property.

While sandalwood still broadly occurs across the Coolgardie, Murchison, Gascoyne and Yalgoo biogeographic regions, population numbers and plant condition vary considerably due to cumulative impacts associated with domestic ungulates, pest and feral species, lawful and unlawful take, altered fire regimes, deterioration of soil and water quality, and climate change.

These threats, particularly the broad extinction of woylies and boodies across mainland regions, give rise to strong concern for whether the current cohort of young sandalwood plants is sufficient in number to replace the projected decline of senescent sandalwood over the next 50 to 100 years. Sandalwood is listed as Vulnerable on the International Union for Conservation of Nature Red List and included on the Commonwealth Threatened Species Scientific Committee's Proposed Priority Assessment List. The assessment process is intended to be completed in October 2024.

KEEPING IT WILD

Whether sandalwood qualifies as a threatened species or otherwise, it is clear that the species requires active management to limit its decline and promote population recovery. Without intervention, the species' wild distribution may become confined to Wheatbelt nature reserves, the Great Western



Woodlands and watercourses in the northern and eastern rangelands and deserts.

It is critical that management of the species considers environmental, social and economic sustainability pillars including the potential for sandalwood to contribute to Aboriginal economic development for better social, health and cultural outcomes.

As such, this juncture may be the crossroads in which to align species management with opportunities for Aboriginal people, particularly those of the Central Deserts and Southern Rangelands. Now is the time for innovation and cooperation between Traditional Owners and the wider community.

TRADITIONAL KNOWLEDGE

Traditional Owner knowledge that has developed and been sustained through innumerable generations being connected with Country has intrinsic importance to biodiversity conservation, ecological processes, sustainable resource use and management. Traditional knowledge systems are complex, holistic and interdisciplinary.

> "Traditional sandalwood knowledge and western science working together respectfully can produce positive and innovative outcomes."

For example, Aboriginal peoples have always known the healing properties of the sandalwood seed kernel in the treatment of conditions such as rheumatoid arthritis and skin lesions and sores. Western science glimpsed this understanding in the early 2000s with the laboratory discovery of high concentrations of oleic acid and the rare ximenynic acid in the kernel. These constituents have high anti-inflammatory properties and regulate unsaturated fatty acids in human tissues.

Traditional sandalwood knowledge and western science working together respectfully can produce positive and innovative outcomes.

A TREE FOR THE FUTURE

Understanding that the drivers of sandalwood decline are multi-faceted enables the formulation of detailed, locally-specific sandalwood management plans that prescribe processes to establish and nurture seedlings and determine ecologically sustainable levels of use. Plans in some locations may deal with threats such as the increasing incursion of camels while other locations may focus on innovative seedling establishment processes attuned to the changing climate. There is also real opportunity for sandalwood management works to also benefit the wider environment through measures such as investment in Traditional Owner on-Country programs for fencing, fire management and fauna reintroduction.

Currently, 11 per cent of lands within the distribution area of sandalwood are managed for conservation by the Department of Biodiversity, Conservation and Attractions (DBCA). This land area

is dwarfed by the area subject to Native Title. Traditional Owners that decide sandalwood management is within their Country and community objectives may significantly contribute to its management at a far greater scale than is possible by State or Commonwealth government agencies alone.

DBCA is currently finalising a *Sandalwood* (Santalum spicatum) *Biodiversity Management Programme (Sandalwood BMP*) to provide for the conservation, protection, and management of wild sandalwood. This process involves considering and incorporating submissions provided by Traditional Owners, conservation interests, industry and the wider community. The Sandalwood BMP seeks to establish meaningful objectives, strategies and actions to stabilise wild populations through conservation and ecologically sustainable use criteria.

Midas of Greek mythology was rewarded by the god Dionysus with the magic of turning whatever he might touch to gold. After being initially overjoyed, Midas soon learned the curse in the powers that he had coveted. Will the wonder of sandalwood filling its cells with golden oil be its ultimate curse or saviour?

Opposite page
Left Historic sandalwood cutters' camp.
Photo – Jiri Lochman
Right Twisted branches of a dead sandalwood tree.
Photo – Benjamin Sawyer/DBCA

Above left Sandalwood seedling.
Photo – Jiri Lochman

Above right Ripe sandalwood fruit.
Photo – Ann Storrie

Right Mature sandalwood leaves.
Photo – Benjamin Sawyer/DBCA

Below right Vibrant healthy sandalwood with maturing fruit.
Photo – Jiri Lochman

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